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COAL GASIFICATION EMPLOYMENT
OPPORTUNITIES FOR RESIDENTS
OF THE OLD WEST REGION

Volume I - Summary and Analysis

A Preliminary Analysis
of
Issues and Potential Programs

April 15, 1974

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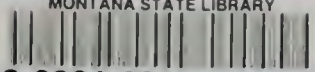
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April 15, 1974

Mr. Warren C. Wood
Federal Co-Chairman
Old West Regional Commission
2000 L Street, N. W.
Washington, D. C. 20036

Dear Mr. Wood:

Enclosed are three copies of our report on Coal Gasification Employment Opportunities for Residents of the Old West Region. This is a preliminary analysis of employment problems and potentials associated with the prospective development of coal gasification plants throughout much of the Region.

Our investigation confirms that a significant number of new jobs will be created by developmental activities throughout the next decade. It also appears that a considerable need exists for programs which will maximize employment possibilities for residents of the Region. It is also clear that the best time to begin planning for these events is now and that an important coordination role must be played among numerous interested parties. A consensus view of how this is to be achieved seems a great need.

We have enjoyed working with you and Susan Sizer on this preliminary effort. The report reflects a valuable investment in identifying and understanding the diverse considerations relating to coal gasification development. To this end, we have involved both our East and West Coast staffs in this work. From our El Segundo office, Lisa Reger and Jim DeMarco provided the investigation of petroleum refinery staffing patterns. Our Washington office provided the background research and report preparation. Linda Sadler developed the basic text of the report under Bill Graham's direction.

We hope you will find our report informative and its recommendations useful. We shall welcome an opportunity to discuss this material with you -- especially the matter of developing a strategy for implementing those recommendations you find of greatest appeal.

Sincerely,


Manuel R. Caldera
President

MRC:mlv
Enclosure

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SUMMARY

This preliminary study of the need for vocational training programs to accommodate the development of coal gasification plants in the Old West Region reveals the following:

- Despite uncertainties, at least 11 different companies or groups have expressed varying degrees of interest in developing coal gasification plants in Montana, North Dakota and Wyoming. The first plants are likely to begin operations in 1978 or 1979. By 1986 it is anticipated the number will be 14.
- Each plant will require an average of approximately 1550 construction workers for three years and upon completion 300 miners and 625 plant workers.
- The States of Montana, North Dakota and Wyoming all have resources to draw on to insure effective utilization of in-State labor sources. These are departments of education, and employment services. Some of these are actively working with pipeline companies who will be building coal gasification plants and developing plans for training employees. Some post-secondary programs have been planned.
- Federal funds are available under five Federal programs. The most important are the new Comprehensive Employment and Training Act of 1973 (CETA) which provides for the States to assume a growing responsibility for vocational education and the Vocational Education Amendments of 1968 which provides funding for all regular vocational education activities.
- Among the States, many modest but excellent programs are under way from which others in the Region might benefit. The most important need is for a regional forum for the coordination and planning of vocational education. This need could be met by OWRC.
- Specific programs which could help insure utilization of in-State labor sources are:
 - . General Career Education - to provide high school students with knowledge of all levels of jobs in coal gasification.

- . Specific Professional Career Education - to provide high school and college students with specific requirements for professional occupations while in high school and college.
- . Skilled Labor Training - to provide training for skilled jobs in construction, mining and plant operation.
- . Career Conferences - to provide information to students and general public on job opportunities and requirements.
- . Come Home Campaign - to provide information to people who have left region that work is available.
- . Vocational Reeducation - to provide post secondary opportunity to study math, physics and chemistry in order to qualify for semi-skilled plant jobs.
- . Job Corps Program - to modify programs of existing Job Corps Centers to provide training in coal gasification job opportunities.

ASSIGNMENT AND METHODS

The Old West Regional Commission has engaged Amex Civil Systems to conduct a preliminary study of the need for vocational training programs to accommodate the development of coal gasification plants in the Old West Region. The study is to investigate means by which effective utilization of in-State labor sources may be assured.

This report addresses the anticipated development pattern of coal gasification plants and the employment opportunities presented. The employment opportunities surveyed not only embrace those in plant operation but also those associated with allied mining activities and plant construction. It also summarizes educational and training resources available in the Region and suggests programs and funding sources which might be used to develop in-State sources of labor.

The information presented was gathered through personal and telephone interviews and by surveying technical journals as well as industry and government records. Sources of information contacted included:

- State Departments of Education in Montana, North Dakota, and Wyoming;
- State Departments of Employment Security in North Dakota, Wyoming, Nebraska, Montana, and South Dakota.
- Personnel Departments at oil refineries;
- Coal Gasification staffs of seven pipeline companies;
- Representatives of the American Gas Association, the National Coal Association, and the Ford Foundation;
- Staff specialists at the Office of Coal Research (Interior), the Bureau of Natural Gas, (Federal Power Commission), and the Division of Vocational and Technical Education (HEW);
- Consultants to pipeline companies, including the Lurgi Co.; and
- Staff members and consultants to the Old West Regional Commission and the Northern Great Plains Resources Program.

A number of activities contributing to the goal of optional employment for in-State residents in coal gasification are

already underway in some State agencies and schools. They are, however, not systematically coordinated within or among the states involved. OWRC could lend its assistance by helping develop a regional program for vocational education and by facilitating cross fertilization among the appropriate operating agencies.

SOCIO-ECONOMIC BACKGROUND

The bonds that tie the States of the Old West Region together are very basic -- common problems, similar resources, and parallel goals. Despite vast distances, a varied geography, and uncounted local differences, the unifying factors are clearly dominant. The problems, resources and needs of the Region deserve comment. First the problems; sizable areas in each Old West State continue to experience patterns of (a) significant out-migration, (b) persistent underemployment, and (c) pockets of high unemployment.

Out-migration is unusually high and most severe among young-adults. In some of the States, the rate is as high as 50 to 60 percent of all high school graduates. Natural population increases have failed to offset the high out-migration. The result has been falling total populations in some areas -- particularly among the economically most productive age groups within the population.

The rates of unemployment^{1/} in the region are highest in the three states where coal gasification development is expected. These rates reflect the very high unemployment within specific areas of the States -- e.g., on some Indian reservations unemployment rates run as high as 80 percent. Unemployment rates for the Region follow:

	<u>1970</u>	<u>1971</u>	<u>1972</u>	^{2/} <u>1973</u>
Montana	6.6%	6.9%	7.4%	6.3%
Nebraska	2.8	3.4	3.3	-
N. Dakota	4.2	4.8	5.1	5.1
S. Dakota	3.3	3.5	3.6	-
Wyoming	4.4	4.5	4.1	3.4
U.S.	4.9%	5.9%	5.6%	4.9%

Both the natural and institutional resources of the five states have similar qualities. Each State is endowed with (a) well-educated and industrious populations enriched by pioneer traditions, (b) a quantity of unspoiled and productive land and open-spaces, and (c) a variety of mineral resources, including

^{1/} Source: U.S. Department of Labor, Manpower Administration, Manpower Report of the President: A Report on Manpower Requirements, Resources, Utilization and Training (Annual).

^{2/} Source: State figures from U.S. Department of Labor, Manpower Administration, as reported by State Employment Agencies 4/8/74. U.S. figure from Bureau of Labor Statistics.

coal and lignite, for which the full potential remains unrealized. Water, like coal, is not uniformly distributed in the Region. If coal's potential is to be realized, its exploitation will require coordinated development with use of the Region's water resources. The largest concentrations of developable coal deposits have been identified in Eastern Montana, Wyoming, and Western North Dakota.

The Old West is equally fortunate in its institutional resources. These present a total environment which industry should find attractive. With specific reference to coal gasification development, existing educational programs in the States reflect a progressive acceptance of the flexible role required of vocational education in today's industrial environment. Present programs offer an entirely suitable base on which to build training programs designed especially for the needs of coal gasification developments and the communities within the Region.

Both the public and State officials seem receptive to the notion that deliberate steps should be taken to develop resources and create employment opportunities within the Region. Differences in outlook or points of view can be noted. Geographically, views most conducive to rapid and large-scale development seem to be found in Wyoming. The climate of opinion in North Dakota appears to be the most cautious. However, in each State, the idea that development should be so managed as to foster optimal employment among local residents seems well implanted. That some steps -- as yet undefined -- should be taken to assist local residents in qualifying themselves for employment opportunities to be opened by resource development is a concept with equally wide acceptance.

PLANNING FOR COAL GASIFICATION

The energy shortage acts as a generator of coal gasification plans. Uncertainties surrounding the shortage -- particularly with respect to fuel prices and associated Federal policies -- are the sources of corresponding uncertainties in every firm's plans. Although much planning is underway, many companies are keeping their options open while watching developments carefully.

In addition to the questions of market feasibility, uncertainties exist in terms of technological processes. New technologies have been developed and are currently in the experimental stages but have not yet been proven commercially. Another problem is the question of the economic desirability of coal gasification (or liquefaction) vs. off-shore natural gas, imports, etc.

Currently the government is appealing a judicial decision that the Federal Power Commission has jurisdiction over synthetic gas rates. As a result of these uncertainties, many companies are keeping their plans flexible by obtaining coal rights while preparing for coal gasification and awaiting developments. Consequently, reliable estimates are not now feasible for the number and exact location of coal gasification plants to be constructed in the old West Region during the 1980's.

However, at least 11 different companies, or groups consisting mainly of pipeline and coal companies, have expressed varying degrees of interest in developing commercial coal gasification plants in the states of the Old West Region. Table 1 titled Pending Coal Gasification Plans in the Old West indicates the lead companies, the location of their interest and the specificity of their plans.

Since only the Lurgi process has been commercially used,^{3/} all companies currently planning coal gasification plants will use this system. Within 5 to 10 years, as experimental methods of coal gasification are proven commercially viable, new plants are expected to use technologies which will be more economical than today's Lurgi process.

A standard module has been adopted for planning the size of most coal gasification plants. An output module of 250 million cubic feet of gas per day (mcf/d) is used by Lurgi engineers. Planned output is increased in multiples of 250 mcf/d by providing for the construction of additional modules of this

^{3/} It has been commercially utilized in at least 12 foreign plants. Two of these are presently in operation: The Scottish Gas Board in Westfield, Scotland and South African Coal and Gas Corporation, Ltd., Sasolburg, South Africa.

TABLE 1

PENDING COAL GASIFICATION PLANS IN THE OLD WEST

<u>Lead Company</u>		<u>State and Location of Interest</u>	<u>Specificity of Plans</u>
Carter Oil Co.	✓	Wyoming Counties of Johnson and Sheridan	Feasibility study for a coal gasification plant underway. Have 16 coal leases and water rights.
Colorado Interstate Gas Co.	✓	Montana Sarpy Creek Wyoming	Intentions to rely on coal gasification announced. Has option on certain Westmoreland reserves at Sarpy Creek.
Conoco	✓	Wyoming North Dakota Montana	Has experimental plant at Rapid City, S.D. Operated methanation plant in Scotland. Own coal in the three states.
Decker Coal Co.	✓	Montana Birney	Uncommitted reserves available are sufficient to attract gasification plant development.
El Paso Natural Gas	✓	North Dakota	Construction started on New Mexico coal gasification plant.
Michigan Wisconsin Pipeline Co.	✓	North Dakota Counties of Dunn, Mercer, Oliver, McLean	Construction started on New Mexico coal gasification plant.
Montana Power Co.	✓	Montana Colstrip	Interest expressed in developing a coal gasification facility.
Natural Gas Pipeline Co. of America	✓	North Dakota Central Dunn County	Agreement with Star Drilling made in 1973 for exclusive development rights to lignite for future gasification projects.

TABLE 1 (Cont'd)

<u>Lead Company</u>		<u>State and Location of Interest</u>	<u>Specificity of Plans</u>
Northern Natural Gas Pipeline Co.	✓	Montana Powder River Basin	Consortium announced in April 1973 to construct SNG plant.
Panhandle Eastern Pipeline Co.		Wyoming Counties of Converse or Campbell on Ashland Reserve	Plans announced for plant in area of Gillette, Casper and Torrington.
Texado, Inc.	✓	Wyoming Counties of Johnson and Sheridan	Letter of intent signed for acquisition of Reynolds Metals coal and water rights. Speculation is that coal gasification development is planned.
Union Pacific	✓	Wyoming Rock Springs	Specifics unavailable.

Source: Conversations with pipeline officials and reports from NGPRP Document 9/25/73, N. Dakota State Water Commission 11/15/73 and Synthetic Fluid Fuels. See bibliography.

standardized size. In some circumstances, four module installations (one billion cfd) have been found to offer advantageous economies of scale.

Investment estimates for a plant of 250 mcf/d range from \$300 million to \$400 million. This sum includes engineering, land, structures, and fixed equipment. Coal consumption estimates vary even more widely, depending on assumptions as to efficiency, continuity of operation, and the quality of the fuel. Expert judgments fall in a range of from 20,000 to 42,000 tons a day -- or roughly 7 to 15 million tons each year for a 250 mcf/d unit. In typical strip mining operations, a fuel requirement of this volume might use 350 acres annually.

The time frame in which projected gasification plants will be built is uncertain. Some companies expect to spend 3 to 4 years in planning and assessment and 3 in construction. The two companies most likely to begin production first are Michigan Wisconsin Pipeline Co. and Panhandle Eastern Pipeline Co., both of which aim to begin operations in 1978 or 1979. Colorado Interstate, Northern Natural Gas, Natural Gas Pipeline and Carter Oil expect to open perhaps a year or two later.

The Northern Great Plains Research Program (NGPRP) supplied the following cumulative estimates of the numbers of plants expected in the Old West Region^{4/}:

<u>Date</u>	<u>State</u>			<u>Regional Total</u>
	<u>Wyoming</u>	<u>N. Dakota</u>	<u>Montana</u>	
By 1980	1	-	-	1
By 1985	2	2	3	7
By 2000	3	7	6	16

Our inquiries suggest that more plants may be in operation earlier than the NGPRP report indicates. The interest in coal gasification is such that many companies are anxious to try their hand. Some companies are known to be interested but have not yet made public any plans.

These circumstances seem to warrant the conclusion that for every "known" company deciding to construct a plant, another

^{4/} NGRP draft report, p. 15. See bibliography.

"unknown" company may actually do so. Thus our estimates of the number of companies involved and their time tables^{5/}:

<u>Date</u>	<u>State</u>	<u>Number of Plants (by Companies)</u>	<u>Totals</u>	
			<u>Period</u>	<u>Cum.</u>
By 1980	N. Dakota	1 (Michigan Wisconsin)		
	Wyoming	2 (Panhandle Eastern, Carter Oil)	3	3
By 1983	Montana	2 (Northern Natural, Colorado Interstate)		
	N. Dakota	1 (Natural Gas)		
	Wyoming	1 (Texas)	4	7
By 1985	Montana	2 (Decker, Montana Power)		
	N. Dakota	1 (El Paso)		
	Wyoming	1 (Union Pacific)	4	11

An unknown factor is the willingness of the states to permit or encourage coal gasification plant construction. North Dakota evidently is taking a conservative wait and see attitude. The first plant will be observed to ascertain its impact on the environment, population, housing, etc. If all goes well, the number of plants allowed may be accelerated.

Wyoming, on the other hand, is likely to grant permits for more plants initially than North Dakota. Wyoming officials see coal gasification from industrialization as a way of increasing economic resources and are less apprehensive about possible undesirable side effects. The attitudes toward coal gasification development in Montana is seen to be midway between that of Wyoming and North Dakota. Nebraska and South Dakota have virtually no coal and thus coal gasification development is not an issue.

^{5/}A 4/11/74 conversation with the Wyoming Department of Economic Planning and Development about an unreleased report on coal gasification revealed Wyoming's expectation that 9 plants will be built in the Powder River Basin by 1980 or 1985.

THE NEED FOR TRAINING

Employment Projections

By 1986 a rough estimate of the number of coal gasification plants in the region might be 14. This provides for eight of the active companies building one plant each and three building two plants each.

Each plant will require an average of approximately 1,550 construction workers for three years and upon completion 300 miners and 625 plant workers. Assuming two plants were started each year, a crude scenario may be developed as follows:

<u>Year</u>	<u>No. of Plants Started</u>	<u>Total Construction Workers</u>	<u>Plants in Operation</u>	<u>No. Operational Workers</u>		
				<u>Plants</u>	<u>Mines</u>	<u>Total</u>
1977	2	1,500	0	-	-	-
1978	2	5,900	0	-	-	-
1979	2	9,300	0	-	-	-
1980	2	9,300	2	1,250	600	1,850
1981	2	9,300	4	2,500	1,200	3,700
1982	2	9,300	6	3,750	1,800	5,550
1983	2	9,300	8	5,000	2,400	7,400
1984	-	7,800	10	6,250	3,000	9,250
1985	-	3,400	12	7,500	3,300	10,800
1986	-	-	14	8,750	4,200	12,950

See also Tables 3 and 4 for the number of construction workers by occupation (peak months) and by months of construction cycle.

An approximation of the mining and plant workers needed is indicated in Table 2. There is, of course, no firm evidence that (a) there will be 14 plants by 1986, (b) the estimated single module employment figures will be adhered to by the companies, or (c) the companies will follow the indicated time schedule. Alternative employment configurations could be generated with different numbers of plants having a more or less clustered time table. Any alternative employment configuration would be as speculative as that selected for Table 2.

TABLE 2

PROJECTED TOTAL NUMBER OF WORKERS NEEDED BY TYPE AND YEAR

<u>Type of Worker</u>	<u>Number per Plant</u>	<u>1980 2 Plants</u>	<u>1982 6 Plants</u>	<u>1984 10 Plants</u>	<u>1986 14 Plants</u>
MINING	300	600	1,800	3,000	4,200
Supervisory & Administrative	50	100	300	500	700
Technical	15	30	90	150	210
Production	200	400	1,200	2,000	2,800
Maintenance	35	70	210	350	490
PLANT	625	1,250	3,750	6,250	8,750
Administrative	40	80	240	400	560
Engineering & Technical	40	80	240	400	560
Operators	240	480	1,440	2,400	3,360
Maintenance	305	610	1,830	3,050	4,270
Total Operation	925	1,850	5,550	9,250	12,950

Source: Telephone conversation with Natural Gas Pipeline Company of America

Coal Gasification Employment Patterns

The advent of commercial coal gasification operations in the Old West promises to have far-reaching impacts on the Region's economy and way of life. As shown, thousands of jobs will be created. Construction workers will be needed as soon as ground is broken for the first plant. As plants are completed and begin operation, a sizable number of "permanent" jobs will open up in both mining and plant operations. Each type of activity will require support services. Through this multiplier effect, a substantial number of indirect employment opportunities will also be stimulated.

Construction Workers. It is anticipated that construction of each coal gasification plant will require 3 to 4 years and that the construction force at its peak will number 3,000 for each mcf/d plant. With approximately 14 plants being built in the region by 1986, this activity alone will provide many employment opportunities. At a level of 9,000 new construction jobs, more than \$150 million will flow into the regional economy each year from plant construction payrolls alone. An increase in construction of houses and public buildings will also be required. The states should prepare to train people for this area of employment opportunity so that as many in-state or regional people can be employed as possible.

Mining Employees. Each coal gasification plant will need a full-time mining operation of approximately 300 people to keep the plant supplied. Most plants will probably be sited adjacent to its source of coal. Where this is not the case, the source of coal is likely to be within 100 miles. Many of the jobs that will be available require relatively short periods of training. Again it is important that these new job opportunities not be filled unnecessarily by people from beyond the immediate states in the Region.

Plant Employees. Several systems of categorizing plant employees can be devised. One based on functions would be: supervisory and administrative, engineering and technical, operators, and maintenance. In each of these categories, however, there are people with varying degrees of expertise. For purposes of this report, plant employees are categorized by types of education.

1. Professionals.

Plant managers can be expected to hire professionally trained and experienced personnel for all upper level positions at the coal gasification plants. One company has indicated it will hire technicians and managers from allied industries such as petroleum refineries, and take them to

an operating coal gasification plant in South Africa to give them more specific training. This would not involve more than 20% of their plant personnel. Except for encouraging long-range education programs to prepare professional workers in coal gasification, there is little the states can do to supply this demand.

2. Skilled Labor

This area covers most of the apprenticed trades. It is with this group that the states can do most to ensure a supply of skilled workers within the region by establishing, in cooperation with industry and with unions, as appropriate,^{6/} additional apprenticeship programs. Such programs would be helpful in the area of construction and mining. It is doubtful that apprenticeship programs would be helpful in the plants until they were operating.

Apprenticeship usually takes 3 to 5 years, depending on the specialty and requires a degree of classroom training as well as on-job training. Advanced planning must be done to ensure that local residents are given first choice of the programs. Both the unions and industry will view the labor market in these trades from a national perspective. Their cooperation, participation, and leadership should be solicited as early as possible.

3. Unskilled Labor

Interestingly this group is likely to be hired, almost in its entirety, locally and is not likely to benefit from special purpose (ad hoc) training programs. Many of the companies have expressed the intent to provide on-job training in this area; the work required is such that prior training is seldom appropriate to specific tasks. People filling these jobs are best prepared with a good high school education.

Several company spokesmen have expressed the view that good training in mathematics, chemistry and physics would be of potential value to job applicants. At present, these subjects are frequently not taken by non-academic course high school students. The states can do most by making information available to high school students relative to job opportunities and their potential requirements.

^{6/}It is too early to determine if plant labor will be unionized.

Estimates of Employment

Tables 3-8 are estimates of employment patterns by coal gasification plants. Table 3 shows the construction personnel needed to build a coal gasification plant. Construction will take about three years, with the number of workers in various trades peaking at different times. Table 3 shows the peak number for each trade.

Table 4 illustrates the month-to-month employment requirements for all construction work taken together for a single plant. The peak level of 3,000 is not reached until the beginning of the third year; the average level is not reached until the twelfth month.

TABLE 3

CONSTRUCTION LABOR REQUIREMENTS BY TYPE OF WORK

<u>Type of Work</u>	<u>Peak Number</u>
Asbestos Workers	450
Boilermakers	440
Bricklayers	7
Carpenters	700
Cement Masons	175
Electricians	1,000
Ironworkers	650
Laborers	775
Millwrights	300
Operating Engineers	400
Painters	250
Pipefitters	1,330
Sheetmetal Workers	20
Teamsters	60

The peak numbers of each type of worker will not occur at the same time but over a period of one-and-one half years.

Source: Sterns-Rogers, consultant to El Paso Natural Gas for the Burnham Coal Gasification site where plant size is anticipated to have four to six times the capacity of a 250 mcf/d plant.

TABLE 4
CONSTRUCTION LABOR REQUIREMENTS

(Assuming a June start)

<u>Month</u>	<u>Total Number of Workers Employed</u>			
	<u>First Year</u>	<u>Second Year</u>	<u>Third Year</u>	<u>Fourth Year</u>
June	110	1,750	3,070*	1,700
July	280	1,800	2,920	1,490
August	570	1,870	2,740	930
September	690	1,940	2,520	620
October	730	2,040	2,200	430
November	700	2,100	1,880	240
December	550	1,950	1,840	80
January	550	1,830	1,750	-
February	560	1,940	1,610	-
March	790	2,170	1,700	-
April	1,210	2,620	1,770	-
May	1,570	2,980	1,840	-

*Peak employment for total force

Source: Northern Great Plains Research Program working papers.

TABLE 5

MINE PERSONNEL REQUIREMENTS AND SALARIES

<u>Salaried Positions</u>	<u>Number Required</u>
General Manager	1
Secretary	1
General Superintendent	1
Secretary	1
Mine Superintendent	1
Maintenance Superintendent	1
Chief Engineer - Mining	1
Chief Engineer - Electrical	1
Secretaries for 4 above	2
Administrative Supervisor	1
Clerk-Typists	3
Training Supervisor	1
Safety Director	1
Mine Foremen	9
Employment Director	1
Cost Accountants	2
Clerks - various	3
Purchasing Agent	1
Warehousemen	4
Engineer - specialties	5
Electrical - technicians and linemen	6
Engineer Helpers	6
Laboratory Technicians	2
Extra Bosses	3
Janitor	1
Watchmen	4
Total Number of Positions	63
Total Yearly Salaries \$855,000	

TABLE 5 (Cont'd)

<u>Hourly Classifications</u>	<u>Number Required</u>
Dragline Operators	28
Dragline Oilers	28
Drill Operators	6
Drill Helpers	6
Explosive Loaders	12
Shot Firer-Truckers	6
Dozer Operators	64
Scrapers	12
Loader Shovel Operators	12
Loader Shovel Oilers	12
Grader Operators	4
Supply Trucks	4
Water Trucks	4
Pitmen-Pumpers	19
Coal Truck Drivers	32
Ash Truck Drivers	12
Front End Loader Operators	20
Mechanics	20
Welders	24
Tiremen-Shop Helpers	6
Electrical Workers, Shopworkers, Roustabouts	34
Electricians	16
Grease-Fuel Trucks	<u>6</u>
Total Number of Men	387
Total Yearly Wages	\$4,991,940

Salaried plus Hourly:

Number Salaried	63
Number Hourly	<u>387</u>
Total	450

Salaries	\$ 855,000
Hourly Wages	<u>4,991,940</u>
Total	\$5,846,940

Source: El Paso Natural Gas Company, Burnham Coal Gasification Complex from El Paso's filing before the Federal Power Commission for a certificate of Public Convenience and Necessity, Docket No. CP 73-131.

TABLE 6

COAL GASIFICATION PLANT OPERATING PERSONNEL
REQUIREMENTS AND SALARIES

<u>Supervisory and Staff Position</u>	<u>Number Required</u>	<u>1972 Salary Each</u>
Complex Superintendent	1	\$25,000
Secretary	1	7,500
Manager Operation	1	20,000
Operations Engineer	3	19,000
Clerk	1	7,500
Secretary	1	7,000
Area Engineer	10	17,000
Area Foreman	30	15,000
Manager Technical	1	20,000
Technical Supervisor	1	19,000
Technical Service Engineer	5	19,000
Specialist Engineer	5	19,000
Clerk	1	7,500
Secretary	1	7,000
Chief Chemist	1	16,000
Chemists	4	14,400
Draftsmen	3	13,000
Lab Technician	14	9,500
Maintenance Supervisor	1	20,000
Clerk	2	7,500
Secretary	1	7,000
Maintenance Engineer	5	18,000
Metal Inspector	3	17,000
Shop Foreman	1	17,000
Maintenance Foreman	8	15,000
Administrative Supervisor	1	16,500
Personnel Representative	1	13,500
Asst. Personnel Representative	1	12,000
Personnel Clerks	2	7,500
Training Supervisor	1	10,000
Office Services Representative	1	14,400
Telephone Operators	2	7,200
Janitors	2	6,000
Receptionist-Typist	1	6,000
Chief Accountant	1	14,400
Payroll Clerk	2	7,500
Yield & Shipping Clerks	3	7,200
Data Processing	2	11,000
Material Warehouseman	1	11,700
Purchasing Clerk	2	7,200
Warehouse Workers	4	7,500
Secretary	1	7,000
Security Supervisor	1	16,500
Safety Foreman	4	12,500
Nurse	1	12,500
Security Guard	6	9,000
Total	145	
Total Yearly Wages		\$1,936,000

TABLE 6 (Cont'd)

Supervisory and Staff Positions (brought forward) \$1,936,000

<u>Process Operators</u> <u>(per shift)</u>	<u>Number</u> <u>Required</u>	<u>1972 Salary</u> <u>Each</u>	<u>Total</u> <u>Salary</u>
Operator	19	\$10,500	
Assistant Operator	28	9,000	
Helper Operator	11	8,300	
Pool Operator	5	8,000	
Overtime at 4%	—	Not Estimated	
Total	63		
Total Process Operators (all shifts)	296		
Total Yearly Wages (all shifts)			2,850,000

Maintenance Mechanics

Lead Plant Repairman	8	11,200	
Plant Mechanic	81	10,800	
Helper Mechanic	66	8,300	
Welder	19	11,600	
Machinist	16	11,000	
Painter	3	10,000	
Electrician	11	11,000	
Communication Technician	3	11,000	
Corrosion Technician	3	10,600	
Instrument Technician	9	11,000	
Pool Laborers	61	8,000	
Overtime at 6%	—	Not Estimated	
Total Plant Maintenance			
Add: Contract Maintenance			
Total	280		
Total Yearly Wages			4,320,000

Total Personnel Requirements

Supervisory and Staff	145		
Process Operators	296		
Maintenance Mechanics	<u>280</u>		
GRAND TOTAL	721		
GRAND TOTAL YEARLY WAGES			\$9,106,000

Source: El Paso Natural Gas Company, Burnham Coal Gasification Complex from El Paso's filing before the Federal Power Commission for a certificate of Public Convenience and Necessity, Docket No. CP 73-131

TABLE 7

COAL GASIFICATION PLANT PERSONNEL REQUIREMENTS

<u>Coal Preparation Plant</u>	<u>Number Required</u>
Operations	
Plant Operators (wash screen, etc.)	53
Laborers	23
	<u>76</u>
Maintenance (on site)	
Mechanics	6
Mechanics Helpers	4
Welders	4
Welders Helpers	2
Machinists	2
Pipefitter	1
Ironworker	1
Auto Mechanic	1
Electricians	4
Electricians Helpers	3
Instrumentation Mechanic	1
Instrumentation Mechanic Helper	1
Laborers	12
	<u>42</u>
Storekeepers	
Receiving Clerks	4
Issuing Clerks	5
Stenographers	2
Laborers	8
	<u>19</u>
Chemical Control Laboratory	
Laboratory Technicians	3
Sample Collectors	2
Laborers	4
	<u>9</u>
TOTAL	<u><u>146</u></u>

Source: Michigan-Wisconsin Pipeline Company
Preliminary Manning Table 3/27/74

TABLE 7 (Cont'd)

<u>Gasification Plant</u>	<u>Number Required</u>
Operating Labor,	
Gas Production, Conversion & Cooling	80
Gas Purification	32
Methanation and Product Compression	16
Sulfur Recovery	8
Oxygen Facilities	12
Waste Effluent Systems	24
Steam and Power Generator	32
Raw Water Treating	8
Cooling Water System	4
Tank Storage and Loading	4
Shift Supervision	
Overall Plant	4
Process Units	4
Utilities & Oxygen	4
Coal Preparation	4
Production Supervisors	4
	<u>240</u>
Maintenance Manpower	
Scheduled Maintenance (day only)	150
On-Shift Maintenance	80
Maintenance Supervisors	10
	<u>240</u>
Administration, etc.	
Administrative Personnel	3
Plant Engineers	10
Accounting	6
Personnel and First Aid	3
Laboratory	5
Plant Security	12
Cafeteria	10
Purchasing and Shipping	5
Clerical and Secretarial	10
Warehouse Clerks	6
	<u>70</u>
TOTAL	<u><u>550</u></u>
TOTAL COAL PREPARATION AND GASIFICATION PLANT	<u><u>696</u></u>

TABLE 8

INSTALLATION EMPLOYMENT ESTIMATES
FOR VARIOUS LIGNITE-USING PLANTS AND PROCESSES

<u>Type of Process</u>	<u>Direct Employment</u>			<u>Expected Total Employment</u>
	<u>Plant</u>	<u>Mining</u>	<u>Total</u>	
Electrical Generation				
500 MW	65	60	120	240
2-500 MW	100	110	210	400
Bi-Gas	726	160	880	1,660
Synthane	697	170	860	1,610
Lurgi	791	210	1,000	1,860
CO ₂ Acceptor	274	170	440	770

Source: North Dakota Water Commission contracted Lignite Use Study, p. 52

Beyond general breakdowns of employees into groups as provided by the pipeline companies, it is difficult to tell the precise number of employees needed by occupation, especially where the groups have titles such as operators A, B, and C. Even though plants are in operation in other countries, the Lurgi representative stresses that there will be differences in the plants in this country. These differences are attributable to labor costs, the degree of automation, safety codes and requirements, and differences in the process (most U.S. plants will use a methenation process which has not been used in previous Lurgi plants).

Job descriptions for specific positions are also difficult to obtain. Virtually every pipeline company representative contacted asserted that the jobs in coal gasification plants will be "similar" to those in petroleum refineries.

Petroleum Refinery Employment Pattern

The petroleum refinery examined for this report^{7/} has a total of 697 employees. The plant processes between 125,000 and 175,000 barrels a day. The number of people employed in management is 248. Of these, 187 are in exempt positions and 61 in non-exempt positions.^{8/} The majority of the total employees are hourly represented, and number 449.

The Refinery Manager is responsible for the operations of 6 departments: Environmental Affairs, Accounting, Employee Relations, Maintenance, Operations, and Technical. A detailed breakdown of these departments appears in Appendix A.

The Dictionary of Occupational Titles, Volume I, Definitions of Titles, contains detailed job descriptions for all industries. Occupational descriptions of jobs in petroleum refineries have been collected and are shown in Appendix B.

Oil companies recruit their non-degreed employees through newspaper ads, competitors, and State employment services. Minimal requirements are a high school diploma or GED. It is the practice of oil companies to promote from within. Consequently, potential is more important than background.

^{7/} The refinery visited requested that the information given regarding employment patterns be kept confidential as it was a trade secret. For this reason, the refinery is not identified.

^{8/} "Exempt" and "non-exempt" refers to the applicability of the wage and hour laws with respect to requirements such as special compensation for overtime hours worked.

Operators in a refinery usually have a high school education, plus specific training by the refinery. In some plants, on-the-job training is supplemented by 4 weeks of formal training classes each year for the first three years. Operators tend to have a very low turnover rate and frequently make their jobs into careers.

Oil companies maintain a corp of boilermakers, welders, cribmen, etc., which are utilized for daily maintenance of equipment. Periodically sections of a department are shut down for overhaul and refurbishment. Oil companies contract this periodic work out to contractors who work for all the oil companies and specialize in heavy duty overhauling and repair. These contractors are individuals who have learned their trade in oil companies and have gone into business for themselves.

Mechanization in petroleum refineries plays an increasingly important role in the distilling process so that the most important positions do not necessarily require significant vocational training. There are several reasons for this. The primary reasons are:

- Mechanization has made the distillation processes of petroleum refineries highly automated. Therefore, fewer individuals are required. For example, blending and catalytic operations are now controlled by computers. For the remaining positions which bear titles similar to those found in industry such as machinists and boilermakers, the oil companies provide the training themselves or hire employees from their competitors. The training is highly specialized and unlike most other training received by individuals who have obtained their skills through traditional means, such as union apprenticeship programs or vocational classes, either in school or the armed services.
- The oil refinery personnel interviewed felt that vocational schools are not equipped to provide the requisite training in the span of time and for the same economy that oil companies can.^{9/}

Conversations with pipeline companies indicate that mechanization will also be important in coal gasification plants.

^{9/} Conversations with Casper College refute this view as the college is currently working with Texaco to train instrumentation men for Texaco's petroleum refineries. In general, the response of the Old West states for industrial training has been quite impressive. The view has been expressed that much more could be done if more Federal funds were available.

RESOURCES IN THE STATES OF THE OLD WEST REGION

Existing state capabilities in the region of most relevance are State departments of education and employment services. Related departments are social services and natural resources. In some of the states, particularly in North Dakota, these departments are well coordinated and working together on the impact of coal gasification development. In other states the needed coordination is not so apparent.^{10/}

Vocational education programs exist in all five states of the region. Table 9 indicates the number of secondary schools offering occupational education programs by vocational programs. Table 10 shows the number of post-secondary schools with occupational programs by type of school. Appendix C contains a listing of post-secondary schools offering programs relevant to coal gasification.

Some staff members in Montana, Wyoming and North Dakota are aware of the coming employment needs of the coal gasification companies and expect to be able to help supply trained workers.

Montana

Other than the Montana Power Company, no real movement is present in Montana to remove coal immediately, although there has been much talk about it. As a result, the employment security office has no planned activity for training coal gasification workers.

Montana has five vocational centers for state post-secondary education. Recently before a pulp plant was opened at Missoula, 90 percent of the employees were trained by a cooperative program between the company and the vocational centers. All the centers have flexible programs with open-entry, open-exit features. They can gear up rapidly. Currently, the Butte Vocational Technical Center offers courses in strip mining (as well as gold and copper mining). Approximately 200 people a year are trained. The course work is mobile so it can be accomplished on site.

The Billings Center is closest to the coal deposits and is likely to be the site of increased instruction in subject areas relating to coal.

The high schools in Montana have on-the-job cooperative training programs.

^{10/}Previously CAMPS (Comprehensive Area Manpower Systems) was used to provide this coordination. Under CETA, the governors are to set up a coordinating mechanism which may or may not be CAMPS.

TABLE 9

NUMBER OF SECONDARY SCHOOLS OFFERING OCCUPATIONAL EDUCATION
PROGRAMS, BY VOCATIONAL PROGRAM AND BY STATE:
AGGREGATE UNITED STATES, FALL 1971

<u>Vocational Program</u>	<u>U.S. Total</u>	<u>Montana</u>	<u>Nebraska</u>	<u>North Dakota</u>	<u>South Dakota</u>	<u>Wyoming</u>
Agriculture	7,650	60	131	89	60	61
Distributive	5,269	15	40	17	34	16
Health	1,749	2	-	3	6	6
Home Economics	14,196	111	397	125	145	70
Business & Office	10,386	83	410	55	39	71
Technical	1,754	5	-	3	12	-
Trade & Industry	8,080	52	109	13	19	10

Source: Director of Secondary Schools with Occupational
Curriculums, 1971. National Center for Educational Statistics,
DHEW, GPO.

TABLE 10

NUMBER OF POST SECONDARY SCHOOLS WITH OCCUPATIONAL PROGRAMS
BY TYPE OF SCHOOL AND STATE: AGGREGATE UNITED STATES, 1971

<u>Type of School</u>	<u>Total</u>	<u>Montana</u>	<u>Nebraska</u>	<u>North Dakota</u>	<u>South Dakota</u>	<u>Wyoming</u>
Technical or Vocational	1,027	7	12	1	11	0
Technical Institute	306	0	3	0	0	2
Business/ Commercial	967	4	9	5	5	0
Cosmetology	1,481	10	19	10	4	4
Flight School	1,345	20	23	17	7	10
Trade School	597	2	6	1	1	1
Correspondence School	114	0	0	0	0	0
Hospital School	1,134	6	12	12	11	1
Junior/Com- munity College	782	3	3	5	3	7
College	384	2	4	5	6	0
Other	<u>45</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>
TOTAL	8,182	54	91	57	48	25

Source: Directory of Post Secondary Schools with Occupational Programs, 1971, National Center for Education Statistics, DHEW GPO, Page XVII

North Dakota

North Dakota has six post secondary vocational-technical education centers offering courses in the areas of agri-business and natural resources, business and office education, distributive education, health, home economics, technical, trade and industrial occupations. At least 10 courses in these subject areas currently offered could be useful to the coal gasification companies.

The Departments of Vocational Education and Employment Services have already been in contact with unions and representatives from Michigan Wisconsin Pipeline to make preliminary plans for a specialized program to train coal gasification workers. Plumbers, carpenters, electrical workers, truck drivers and construction workers are among the employees the State is anticipating training.

The people of the State are very conscious of coal gasification plans and are concerned about the impact. When the anti-ballistic missile sites were built, many skilled workers came from without the State.

Currently the Department of Vocational Education is concerned with programs relating to increases in farm implement production and impacts of increased irrigation activities.

The relationship between the Departments of Vocational Education and Employment Services is very close. The latter department locates and places trainees and the former department trains them. They also coordinate closely with the Departments of Social Services and Natural Resources. Normally the Employment Services Department contracts with the following groups to provide training: Manpower Development, National Alliance of Businessmen (NABS), Job Opportunity in the Business Sector (JOBS), and the University of Minnesota.

In preparation for coal gasification, Employment Services has alerted their personnel through seminars held in conjunction with the State Department of Labor, Natural Resources and Water Conservation. In addition, Employment Services held a meeting with school teachers and college professors to tell them about coming job opportunities in coal gasification.

High schools now have comprehensive vocational offerings and four high schools have combined programs to have vocational center programs. The vocational courses are relatively new to North Dakota so that most high school graduates have backgrounds in academic course work.

The University of North Dakota has courses in the uses of lignite and is consulted by the State departments. The Grand Forks Coal Research Laboratory does research on all types of coal found in the West.

Wyoming

Employment Services of Wyoming is very much aware of the coal gasification plans on the drawing board and is working with the Governor's Planning Council to ensure participation by Wyoming's residents.

In addition, they have met with Carter Oil to provide a listing of their employment needs. Comprehensive Employment and Training Act funds are being used to work with the school districts to determine their needs.

It is expected to be three years before the first coal gasification plant is ready for operation, but the coal will be mined in 1975. A study of the four-county Powder River Basin is being conducted by the Department of Economic Planning and Development. It is studying types and numbers of workers needed for coal gasification plants in Sheridan, Johnson, Campbell and Converse Counties. It should be released about May 11.

Wyoming has a network of seven community colleges which can respond to training needs as they are identified by industry. Courses are currently offered in heavy equipment operations, coal field technology and equipment maintenance at Casper College. Carter Oil has just awarded a grant for the coal technology program. (See Appendix D for materials on energy development training.) Rock Springs offers a course in mine maintenance. Central Wyoming College offers a course in electronics. These courses are conducted by the Departments of Vocational Education in conjunction with the Department of Development with Manpower Development funds. Apprenticeship funds are also used at Casper for programs for electrical linemen, plumbers, iron workers, etc.

The schools at Gillette and Rock Springs are closest to the coal deposits and thus the most likely locations for increased coal-related courses.

The occupational section of the Department of Education has developed an occupational information program called WORK for Wyoming Occupation Resources Kit. The microfische kit describes current and projected needs for workers in Wyoming, training needed and wage level for each occupation. Students can use the kit and have a printout for a cost of about 7 cents per use.

Wyoming does not have a Job Corps Center and uses two in Montana.

Nebraska

Employment Services has made no plans in regard to any coal related industry as there is relatively little coal in Nebraska. Under the new CETA regulations, the department does not expect to do any job training.

Both community colleges and vocational technical schools offer vocational courses. There is no Job Corps Center in the State and trainees go to Pine Ridge, South Dakota.

South Dakota

The Department of Employment Security has no plans for training related to coal gasification projects. The people who work in the experimental gasification plant in Rapid City have already been hired and trained. No other coal related industries appear to be developing in the State.

Currently the department is meeting to determine how funds under the Comprehensive Employment and Training Act of 1973 can be best utilized, but there are no plans to use the funds to train South Dakotans to work in other states.

The Job Corps Center at Box Elder offers carpentry, welding, mechanics, heavy equipment operation and other apprenticeship construction trades. Some of the 200 young men in residence are from nearby states. Employment Security helps to determine curriculum in addition to recruiting for the Center.

High schools offer minimal shop capabilities and five vocational technical schools (post secondary) offer more intensive training.

FEDERAL FUNDS FOR VOCATIONAL EDUCATION

The following legislation provides for Federal-aid programs already in use by the States and could be used to fund programs such as those suggested in this report:

- Vocational Education Amendments of 1968
- Comprehensive Employment and Training Act of 1973
- Education Professions Development Act
- Adult Education Act
- National Apprenticeship Act of 1937

The Vocational Education Amendments of 1968 are administered through HEW and provide funds to States for vocational education in high schools, post-secondary schools and adult training programs. Funds from this source are now being used by the States on programs of the following types: Special Education for the Disadvantaged, Vocational Programs, Research, Exemplary Education Programs, Consumerism and Homemaking, and Cooperative and Work Study Programs. For 1972, the Office of Education reports that Federal contributions under the Vocational Education Act, as amended, to Montana totaled \$2,140,551; Nebraska - \$3,608,032; North Dakota - \$2,076,888; South Dakota - \$2,097,310; and Wyoming - \$1,131,803.^{11/} Central administrative responsibility lies with the State Directors of Vocational Education in each State Department of Education.

The Comprehensive Employment and Training Act of 1973 (CETA) is administered by the U.S. Department of Labor and is intended to provide special services for those who cannot take advantage of the programs offered under the Vocational Education Amendments. The States are currently making plans to use CETA funds beginning July 1, 1974. Unlike the Manpower Development Act, which it replaces, CETA requires a five-year plan. It is expected that after initial one-year plans are completed, work will begin on the longer range plans.

The Education Professions Development Act is very broad legislation which includes the development of vocational education personnel. This act is expected to undergo major revisions by Congress in June. There is a chance that this entire program will be phased out.

The Adult Education Act would seem to be an appropriate vehicle for some of the programs contemplated here. However, the Act is also scheduled for congressional revision so that projection of its use based on the Act's present format is largely speculative.

^{11/} Vocational and Technical Education Selected Statistical Tables, Fiscal Year 1972, Vocational Education Information No. III, USHEW, Division of Vocational and Technical Education, p. 3.

The National Apprenticeship Act of 1937, administered through the U.S. Department of Labor, is designed to involve employers, unions, and the Bureau of Apprenticeship and Training in a Joint Apprenticeship Committee. An Apprenticeship Council operates similarly in each State.

The channels through which Federal funds are tapped vary with each of the above acts, but certain trends and common elements deserve comment. The methods by which funds are allocated to specific programs have undergone significant change in the transition from the Manpower Development Act to the Comprehensive Employment and Training Act. The CETA philosophy is to distribute available funds to the States and major cities (100,000 or more population) on a formula basis while allowing these "prime sponsors" to allocate resources among projects in given activity categories. This approach places prime responsibility on State and local government for the difficult decisions which must be made among program objectives and alternative means for reaching goals.

Though differing from CETA in detail, the basic responsibility for decision among alternative resource uses rests with the States for programs funded under the Vocational Education amendments.

As additional State-aid acts undergo legislative review and revision, consideration will certainly be given to the adoption of funding mechanisms similar to the CETA method. The pattern of shifting greater responsibility for program and resource-use decisions from Federal to State and local agencies has occurred in a number of fields in recent years. Further consideration of this principle in the area of education and training is expected by some observers.

No basic revisions in the provisions of the Vocational Education Amendments are projected at this time although a continued administrative effort to minimize centralization of authority may be expected. Similarly, no plans to modify funding procedures followed under the Apprenticeship Act appear in the offing. Local programs under the apprenticeship program differ from the others in at least one important respect. Local agencies apply for Federal assistance through field offices. Assistance under this program has long emphasized local and decentralized responsibility in program design and approval.

Under each Act, specific State (or local) agencies have been established as designated channels for administering Federally assisted programs. Though interagency cooperative undertakings are entirely feasible, new or modified programs are often facilitated if the funding agency at the State level and the agency

with central administrative responsibility are the same. For this reason, it is important to plan new functions carefully so that jurisdiction over funding and program development will not conflict. This implies parallel responsibility or an especially careful top-level coordination.

Methods used to obviate the need for step-by-step approvals by Washington agencies include carefully drawn program standards and requirements for long-range planning at the State and local level. The Federal administrators of CETA, Vocational Education, and Adult Education all require State plans. Each of the States has a person or an office charged with responsibility for developing a State plan for each of the three laws. For this purpose, Education Professions Development is included within Vocational Education. Any potential program thus must be included and budgeted for in the appropriate State plan. There is no State plan required for National Apprenticeship programs and applicants apply directly to the Federal government.

General revenue sharing is not likely to have much effect on vocational education as alternative sources of income are available through property taxes and State willingness to fund education.

In summary, specific recommendations for utilizing Federal funds for particular vocational training and development programs cannot be decided in advance of program development studies. Much depends on the details of program content, administrative options, the timing of implementation in relation to Federal legislative developments, and most important, an analysis of relative program priorities in each of the affected States. Since long-range planning is now generally a prerequisite to Federal aid, it follows that it is important for the appropriate State planning agencies to express a continuing and coordinated interest in the training needs of prospective coal gasification workers.

RECOMMENDATIONS

Inquiries about vocational education programs in the Old West suggests that the States would be well served by efforts to coordinate vocational education planning in the Region. This could be achieved in two ways. The first is general and would consist of the OWRC establishing a forum for the coordination of programs and planning. The second is more specific and would consist of a number of separate projects.

General Program Needs

The need for a regional forum arises from the fractionation of the Federal government's responsibility for vocational education. At least five laws provide for vocational education. They are administered by five agencies in at least two departments. At the local level they are administered by divisions of secondary education, post-secondary education, departments of employment services, joint apprenticeship committees, Job Corps Centers, etc. Many of these administrative units seem to be unaware of the others' capabilities and activities on the State level. All of them need to be in touch with business and industry and some of them, for example Casper College, are. A central forum for general dissemination and cross fertilization would help supply these needs.

The old CAMPS program (Comprehensive Area Manpower Systems) has been responsible for a coordinating role but at the option of the Governors under CETA may be replaced by other planning mechanisms.

Among the States, many excellent programs are under way, but they are unique to their own state. Cross fertilization and determination of general plans could, for example, remove any need for each State to provide comprehensive courses relating to coal gasification.

OWRC could meet this need by coordinating efforts of various state agency personnel, public and private secondary and post-secondary counsellors and teachers, industry and union efforts in vocational education by various techniques. These might include the development of a regional five-year plan for vocational education; regional conferences for teachers, guidance counsellors and advisors on various kinds of vocational educational opportunities available; development and dissemination of regional newsletter, etc.

A time table for 1974 might include the planning and preparation of materials and conference plans. The first conference speakers could include Federal liason staff members.

Possible funding sources might include the Old West Regional Commission, State Offices of Education, and Industry.

Specific Program Possibilities

There are three areas of need for training in relation to the development of the coal gasification industry in the Old West Region. These are construction, mining, and plant operating employees.^{12/}

Except for long-range general programs, it does not seem feasible to train the professional employees that will be needed. The workers hired for these positions are likely to be experienced in similar work and will be given specific training by the employing company, perhaps on-site at another coal gasification plant overseas or at an experimental domestic site.

The unskilled workers to be hired are likely to be local; but again, beyond insuring that high school graduates have backgrounds in mathematics, chemistry and physics, training programs are not likely to be helpful. Specific on-the-job training by the companies will be the most efficient and useful means of training.

The area of skilled labor in mining and construction is where a state or regional training program can be of most value in increasing native regional employment.

In addition to providing actual training, the states or region could provide a valuable service by making information about the coal gasification industry more readily available to the public.

The following programs are suggested means by which States in the Old West Region can maximize the number of residents hired by coal gasification plants:

- General Career Education
- Specific Professional Career Education
- Skilled Labor Training
- Career Conferences
- Come Home Campaign
- Vocation Reeducation
- Job Corps Program

Following are brief outlines of (1) what such programs could do, (2) a basic time table, (3) possible funding sources, and (4) a frame of reference.

^{12/} In addition, pipeline workers may be needed, depending on the location of the plants in relation to the nearest pipeline.

General Career Education

Purpose: To present to high school students the nature of employment opportunities offered by the development of coal resources, on the professional, skilled and unskilled levels of jobs available, training needed, duties performed and opportunities for vertical and horizontal movement. These packages would be designed for use by junior and senior high school students. Also requires development and distribution of materials and training projects for teachers and guidance counselors.

Time Table:

1975-6 Plan program, develop curriculum, train educators.
1977 Begin program.

Funding Sources: Vocational Education Act, Elementary and Secondary Education, coal gasification companies.

Frame of Reference: This ties in with Federal programs addressed to Career Education being funded by the Office of Education (Bureau of Adult, Vocational and Technical Education). North Dakota's Employment Services has held at least one meeting with school teachers to tell them about coming opportunities in coal gasification. Wyoming has developed a "Wyoming Occupation Resources Kit" which describes Wyoming job opportunities.

Specific Professional Career Education

Purpose: To present to high school and college students knowledge of specific professional career opportunities in the coal industry. Requires development and distribution of professional career information packages to guide in choosing college course work. The goal would be to produce local professionals capable of filling middle management and technical positions. Also requires development and distribution of materials and means for training professors and advisors who would pass on information to students.

Time Table:

1975 Plan program, develop curriculum and train counsellors.
1977 Begin implementation of plan in colleges and high schools.

Funding Source: Vocational Education Act, coal gasification companies.

Frame of Reference: This relates to the need for college guidance counselors and professors to provide concrete information to students. North Dakota Employment Services has held a meeting with college professors to discuss jobs in coal gasification.

Skilled Labor Training

Purpose: To provide a supply of skilled laborers in construction and strip mining who can be employed by coal gasification companies in the 1980's. Requires coordination with companies and among state vocational technical schools. Curricula need to be developed in response to industrial needs. Many schools and programs already in operation. Biggest need is for expansion and coordination of efforts.

Time Table:

1975 Develop plans for increased training with high schools, community colleges, state agencies through which funds are available.

1977 Begin programs.

Funding Sources: Vocational Education Act, Comprehensive Education and Training Act, or National Apprenticeship Act.

Frame of Reference: North Dakota is making plans for a specialized program to train plumbers, carpenters, electrical workers, truck drivers, etc., for coal gasification jobs. Casper College is currently working with Carter Oil to provide training for coal field employees. Butte Vocational Technical Center offers course work in strip mining.

Career Conferences

Purpose: To present to the public (mainly students) training and employment opportunities in the area of coal, including professional, skilled and unskilled jobs. This might be done by the OWRC in conjunction with the State Education Offices and the Pipeline companies coming into the region. A standard conference format could be repeated in various cities in the region, perhaps on an annual cycle.

Time Table:

1975 Develop general plans

1976 Develop specific plans, exhibits, interview formats, test, etc.

1977 Begin program

Funding Source: Education Professions Development Act, coal gasification companies.

Frame of Reference: The City of Philadelphia does this annually for college students in conjunction with industry. Could take format of "college night" programs put on by high schools.

Come Home Campaign

Purpose: To notify people who have migrated out of the region that there is work available in their home states, starting with construction work. The person who returns to his home state is more likely to prefer it than an out-of-state worker who is more likely to move again. The come home campaign involves obtaining more precise estimates of manpower needed and manpower available.

Time Table:

- 1976 Develop plans for campaign.
- 1977 Proceed with plans for ads in newspapers, notification of employment offices, and college placement offices.

Funding Source: State economic development offices.

Frame of Reference: Mentioned by coal gasification companies as something they were interested in.

Vocational Reeducation

Purpose: To provide high school level knowledge of chemistry, physics, math, etc. to post secondary students so that they may become better prepared for semi-skilled jobs -- i.e., production jobs in the mines; and operations and maintenance jobs in the plant. This could be done through public school systems' night classes, or as part of on-the-job training offered by the companies.

Time Table:

- 1976 Plan basic program.
- 1978 Implement program.

Funding Source: Comprehensive Education and Training Act or on-the-job training.

Frame of Reference: High schools frequently offer adult education courses in areas that provide additional job skills.

Job Corps Program

Purpose: To use present Job Corps Centers in South Dakota and Montana to teach job skills in the area of coal development to high school dropouts - prepare for jobs in strip mining, construction, plant operation or pipelines.

Time Table:

- 1975 Plan program with Job Corps personnel
- 1976 Implement program

Job Corps Program (Cont'd)

Funding Source: Comprehensive Education and Training Act.

Frame of Reference: Ongoing programs in the region already teach construction, large equipment skills, etc. Centers are in Montana, and South Dakota.

Summary of Programs

These suggestions for modification in the programs of vocational education are long range; and, at this time, are properly in the planning stages. Consideration is currently being given to some aspects of some of these ideas by staff of some state agencies and some educational institutions in the region.

Existing resources in the Old West Region can be used to implement the programs previously suggested. In some cases minor changes could be adopted and in other cases new programs could be developed.

In carrying out these programs, the single most important aspect is coordination between the departments responsible for preparing high school students, those providing training, and those placing personnel in jobs. Plans for physical plants and program plans need to be continuously coordinated with needs for personnel.

The post-secondary community colleges and vocational centers in North Dakota, Wyoming, and Montana provide ideal institutional mechanisms for providing training in construction and mining for coal gasification plants.

Current programs in Wyoming, Montana, and North Dakota, such as heavy equipment operation, mine maintenance, and strip mining should be continued and expanded to relate specifically to strip mining and the employment needs of the plants.

State departments using State and Federal funds can play a significant part in ensuring that information about coal gasification is disseminated. The Old West Regional Commission could do most by ensuring through coordinated efforts that available funds are utilized to the maximum extent.

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